Name _____ AP Chemistry

Buffer Solutions

Example #1

Calculate the pH of a solution that is 0.60 M HF and 1.0 M KF. K_a for HF is 7.2×10^{-4}.

Example #2

Calculate the mass of $NaC_2H_3O_2$ required to prepare a buffer of pH 4.55 when added to 0.500 L of 0.67 M acetic acid, assuming no change in volume. K_a for acetic acid is 1.8×10^{-5}.

Example #3

Calculate the pH when 100.0 mL of 0.50 M HCl are added to the buffer consisting of 20.0 g of $HC_2H_3O_2$ and 18.0 g of $NaC_2H_3O_2$ dissolved in 500 mL of water.

Example #4

Calculate the pH when 100.0 mL of 0.50 M NaOH are added to the buffer consisting of 20.0 g of $HC_2H_3O_2$ and 18.0 g of $NaC_2H_3O_2$ dissolved in 500 mL of water.

Practice Problems

Answer the following question on another piece of paper.

1) Calculate the $[H^+]$ and pH of a solution in which $[NH_4^+]$ is 0.500 M and $[NH_3]$ is 0.20 M.
2) Calculate the $[OH^-]$ and pH of a solution in which [HClO] is 0.25 M and $[ClO^-]$ is 0.50 M.
3) A buffer is prepared by dissolving 0.037 mol of potassium fluoride in 135 mL of 0.0237 M hydrofluoric acid. Assume no volume change after KF is dissolved. Calculate the pH of this buffer.
4) A student is asked to make an acetic acid-acetate buffer with a pH of 4.10. The only materials on hand are 300.0 mL of white vinegar (5.00% by mass acetic acid, D = 1.006 g/mL) and potassium acetate. How should this student proceed?
5) A buffer is made up of 0.300 L each of 0.500 M KH_2PO_4 and 0.317 M K_2HPO_4. Assuming that volumes are additive, calculate:
   (a) the pH of the buffer
   (b) the pH of the buffer after the addition of 0.0500 mol of HCl to 0.600 L of buffer
   (c) the pH of the buffer after the addition of 0.0500 mol of NaOH to 0.600 L of buffer
6) A buffer is made up of 355 mL each of 0.200 M $NaHCO_3$ and 0.134 M Na_2CO_3. Assuming the volumes are additive, calculate:
   (a) the pH of the buffer
   (b) the pH of the buffer after the addition of 0.0300 mol of HCl to 0.710 L of buffer
   (c) the pH of the buffer after the addition of 0.0300 mol of KOH to 0.710 L of buffer